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(54) Title: **SYSTEM AND METHOD FOR PRODUCT PRICE TRACKING AND ANALYSIS**

(57) Abstract:

SYSTEM AND METHOD FOR PRODUCT PRICE TRACKING AND ANALYSIS

Field of the Invention

The invention relates generally to the field of marketing, and more specifically to a method and system for automated product price tracking and analysis.

Background and Related Art

Business transacted on the Internet is taking on many characteristics of an efficient market and, consequently, pricing decisions have greater importance for a company's strategy and marketing mix. Recognizing pricing as one of the dominant marketing variables requires companies to make a significant shift from product-focused sales and marketing efforts to customer-centric sales and marketing. The influence of shop-bots and the increased ease of comparison shopping are forcing e-business marketers to move toward individual, customer-centric pricing both in the consumer markets and the business-to-business environment. This software solution enables companies to design product and services pricing bands, pricing clusters, and/or micro-segment pricing that can be used in conjunction with individualized, one-to-one pricing delivered dynamically to customers.

Dynamic pricing on the Internet is the result of both opportunities in technology (speed, simplicity, and automation in virtual space) and the behavior of customers in the Internet's interactive marketing environment. Consequently, it is easier to gauge Internet customers' price sensitivity to small price changes than it is in conventional channels and markets. However, recent studies by McKinsey and Company, Inc. (McKinsey & Co. Pricing Practice Year 2000 Knowledge Effort) indicate that price sensitivity for segmented groups of customers on the Internet may serve as a proxy for similarly constructed segments in offline markets. In many cases, Internet prices are generally lower and exist across a greater range than in conventional channels--thus creating greater price dispersion. Manufacturers, vendors, and retailers on the Internet adjust their prices more finely and more frequently -- thus creating greater price dynamics. Currently the value is on the edges of the network, with the product on one end and the customer interface on the other. In the future, it is expected that companies will create additional value by testing, monitoring, testing prices on the Internet, and then applying the analysis to offline channel customers.

The Internet's increasingly fluid markets are emerging as "frictionless commerce," requiring manufacturers and e-business retailers to develop and strengthen branding to hold

and increase customer interest and to build value. Concerns such as high switching costs, partnerships and alliances, and service differentiators can act to maintain customer loyalty. Additionally, brand-building promises of superior warranties, better service, reliable delivery, and return policies can help e-tailers fend off lower-cost competitors. These types of value constructs can also be tested and monitored by the present invention.

Most prior pricing research uses choice-based conjoint analysis to determine pricing preferences for specific products. Conjoint analysis of choices, as opposed to ratings or rankings, in use since 1983. *See* Louviere, J.J. and G.G. Woodworth (1983) "Design and Analysis of Simulated Consumer Choice or Allocation Experiments: An Approach Based on Aggregate Data," *Journal of Marketing Research*, 20:350-367, has only recently been used for large-scale commercial pricing analysis. The distinguishing characteristic of "choice-based" conjoint analysis is that the survey subject expresses his/her preferences by making a choice from a set of concepts rather than by ranking them. The task of choosing a preferred price from a group of prices is similar to what buyers do in the marketplace and is a concept that everyone can understand. Choice-based conjoint analysis also allows a survey participant to select "none" or "I wouldn't choose any of these" and thus contribute information about a decrease in demand if the prices of all offered products increased. The major disadvantage of choice-based conjoint analysis is that having respondents make choices is an inefficient way to elicit preferences. Furthermore, the conjoint respondents are only indicating their pricing preferences in an artificial environment that may not adequately reflect real pricing decisions. These analyses also take substantial time to design, conduct, and analyze the results – making the conclusions suspect in the fast-moving e-commerce world.

It has therefore become desirable to develop a new method and system for price tracking and intelligent pricing analysis, as accomplished by the present invention.

Brief Description of the Drawings

The present invention is illustrated by way of example and not limitation in the accompanying figures, in which like references indicate similar elements, and in which:

FIG. 1 is a diagram showing a preferred embodiment of the present invention on an example client site showing the solution accessing both the Internet and the home application service provider (ASP) site;

FIG. 2 is an exemplary screen view showing the Intelligent Pricing Solution Computer Price Monitor- Comparison Function;

FIG. 3 is an exemplary screen view showing the Intelligent Pricing Portal;

FIG. 4 is an exemplary screen view showing the Segmentation interface of the Dynamic Price Manager of the present invention;

FIG. 5 is an exemplary screen view showing the Dynamic Price Monitor Scenario Construction Interface;

FIG. 6 is an exemplary screen view showing the Dynamic Price Monitor Sampling and Segmentation Interface;

FIG. 7 is an exemplary screen view showing the Dynamic Price Manager Crude Elasticity Excel Output; and

FIG. 8 is an exemplary screen view showing the Dynamic Price Manager % Profit over Breakeven Analysis Chart.

Description of the Preferred Embodiment

The following discussion provides a detailed description of at least one embodiment of the invention and should not be taken to be limiting of the invention itself. Rather, any number of variations may fall within the scope of the invention, which is properly defined in the claims following this description. Furthermore, though the invention is discussed in connection with particular names of software components, a person of ordinary skill in the art would appreciate that such names are wholly arbitrary, and are used solely for discussion purposes.

An intelligent pricing solution is disclosed which provides companies with strategic pricing management tools supporting pricing decisions for dynamic, one-to-one pricing on the Internet, via an Intranet, and using wireless or broadband technology. The system and method of the present invention creates a bridge between online, offline, and channel pricing.

A system of this sort should address the following strategic business questions:

1. How to optimize the e-business client's product or service pricing to maximize revenue, and at the same time balance profitability and market share at the customer or the market level;
2. How to improve pricing flexibility and decision-making by developing, monitoring and testing a range of prices for each product's price and cross-price elasticity on the e-company's e-commerce site;
3. How to use company transaction data and competitor price information to determine how Internet shoppers react to prices and other value propositions such

as coupons, services and warranties and then forecast the optimization of both unit volume and revenues for a range of possible prices using pricing models;

4. How to develop scenarios with models to test and monitor various prices, value creation opportunities (e.g. services, warranties, bundles etc.) revenue projections, margin generation, and sales levels for specific products/service and bundles on the client's e-business site;
5. How to set (using the results of profiling tools, customer-specific data, and predictive models) one-to-one dynamic prices for specific products or services to determine what various individual and segments of Internet customers are willing to pay for the subject product at a particular point in time; and
6. How to synthesize pricing information and communicate it to business decision makers to enable changes to the pricing strategy (i.e., specific price changes) and ongoing monitoring and feedback regarding the impact of these changes on the company's business performance.

Intelligent Pricing Solution's Business Context

The Intelligent Pricing Solution is a significant improvement over past processes to capture price sensitivity and value perception related to specific products and thus develop price and cross price elasticities and models of customer behavior around price and purchase decisions. One major advantage of the system is that the testing and feedback systems are real time or near real time, thus enabling product and price managers rapid access to information required for strategic and tactical pricing business decisions. In addition to providing near real time information and rapid feedback on product and pricing decisions made by the visitor on the website, the system of the present invention has several clear advantages over the current method of price testing—choice-based conjoint analysis and econometric models based on historical sales data.

Intelligent Pricing Solution Architecture

In a preferred embodiment, the Intelligent Pricing Solution is a web-enabled, object-oriented set of integrated software components. The software solution set includes the following components, the functionality of which is described in detail below:

1. Price Monitors 10, propriety databases, and Online Analytical Processing (OLAP) query tools for selected industries and products;

2. Pricing Connector 20 (Simple Object Access Protocol{SOAP} version shown);
3. Customer Behavior and Site Monitor 30;
4. Intelligent Price Portal 40;
5. Dynamic Price Manager 50;
6. Business/Price Analyst Workbench 60;
7. Profile Wizard 70;
8. Dynamic Pricing Engine 80;
9. Executive Price Port 90; and
10. Intelligent Pricing Solution Databases 95.

The Intelligent Pricing Solution enables strategic pricing management and dynamic, individualized or one-to-one pricing. Solution software can be deployed within a company's technology infrastructure, over the Internet via an Application Software Provider service (ASP), on enterprise-wide Intranets, or via wireless broadcasts. In one embodiment, the system is deployed by integrating a small footprint connector into the enterprise's e-commerce system with the remainder of the system components deployed on the client's e-commerce site or accessed via the Internet.

The Intelligent Pricing Solution components serve discrete pricing functions as part of a pricing process flow. Each of the components of the Solution is briefly described below:

The architecture of a comprehensive system incorporating the present invention (called the "Intelligent Pricing Solution") is generally shown in Fig. 1. The architecture can best be understood by dividing it into four horizontal segments: (i) customer web server 5; (ii) firewall 15; (iii) host web server 45; and (iv) application server 100. The Firewall 15 which provides security and limits unauthorized interactivity between the Customer Web Server 5 and the Internet occupy the top segment side with direct interconnection to the Internet through which information is gathered, requested and relayed.

Customer Web Server, Contained on the host web server 45 are the Price Connector 20 which is integrated into an example client e-commerce platform and the Intelligent Price Portal 40, and the Price Monitors 10 which operate as pricing data capture agents and data and analysis servers. The Price Connector 20 shown may be implemented as a Simple Object Access Protocol (SOAP) connector that communicates with web server 45 and a Remote Procedure Call (RPC) 25.

Application server 100 contains the Intelligent Pricing Solution software components Customer Behavior and Site Monitor 30, Dynamic Price Manager 50, Business/Price Analyst

Workbench 60, Profile Wizard 70 the Dynamic Pricing Engine 80, and the Executive Price Port 90 as installed on an application server. Also shown is the proprietary Intelligent Pricing Solution Database 95, which captures information from the component applications. Interfaces between the components within the Intelligent Pricing Solution are shown using directional arrows with labels.

The Intelligent Pricing Solution gives businesses the ability to differentiate pricing at the individual, cluster, and/or product level by developing a range of prices (price bands) that match the price sensitivity of each unique individual, company, or market segment. To do this, the Intelligent Pricing Solution uses multiple data inputs including the following:

1. SKU or item-specific pricing data from the company's backoffice databases as well as pricing for substitute products and bundles within a category area;
2. Competitive pricing data from a number of Internet competitors via the Price Monitor(s) 10 or other third party sources;
3. Product fixed and variable cost information (or standard product cost) for the manufacture and sales of specific products or product bundles;
4. Companies' unit sales for e-commerce, prices, promotions, revenue data, and online/offline marketing and sales data;
5. Individual or business-specific profiles developed from the Intelligent Pricing Solution's Profile Wizard 70 alone or in conjunction with other profiling and personalization software engines as sources of Internet customer-specific data; and,
6. Available Internet customer-specific demographic, firmographic, or psychographic data.

The tool set's "Dynamic Price Manager" 50 enables e-businesses to capture real customer decisions around pricing by providing a substitute or test price to a randomly selected customer who selects a targeted product on the client's e-business site. The customer makes the decision to purchase the product or not and the decision (purchase or not purchase) is recorded in the Intelligent Pricing solution database. As a result of capturing actual pricing decisions with real customers on the e-business site, the Dynamic Price Manager 50 provides significant improvement over the "pricing preferences" available through choice-based conjoint studies, focus groups or other current methods of testing price sensitivity. The Dynamic Price Manager can also serve as a monitoring tool for existing pricing strategies or pricing tactics by creating monitoring profiles of the specific prices and the segments for which they are being monitored. Additional benefits include speed with which the data can be

gathered, the ability to segment purchase behavior across a variety of customer types, and the ability to conclude other valuable information about the customers product interests and preferences that can be captured in the clickstream of the selected customers' path on the e-business site using the Customer Behavior and Site Monitor³⁰.

Referring now to Fig. 2, Price Monitor(s) 10 collect individual products, bundles, promotions and service prices and descriptions from Internet-based competitor sites--both manufacturers and retailers--as inputs to provide competitive price information used in the Dynamic Price Manager 50, the Price Analyst Workbench 60, and the Executive Price Port 90. Since both OEM and web retailer prices are captured, multiple prices for the same product are captured and can be presented. Prices are collected frequently, at least once a day and often more frequently, using automated agent technology. The captured HTML or XML pages with pricing and product information are parsed and standardized before being loaded into the subject area-specific databases. E-mail alerts on new products and price changes found at competitor web sites are automatically sent to Price Monitor subscribers and to client executives as part of the Executive Price Port 90 automated pricing intelligence reports.

The Price Monitor(s) 10 are capable of several types of outputs: 1) HTML tables of products and prices generated from proprietary pricing database and displayed on the Zilliant Pricing Portal 40; 2) Automated XML or Excel data feeds can be sent over the Internet for use in the client-based Intelligent Pricing Solution components; and, 3) OLAP and SQL queries can be processed over the Internet via the Price Analyst Workbench 60, the Dynamic Price Manager 50, and the Price Monitor 10 web-based interfaces. Price Monitor users are able to select and save specific competitor product price comparisons (see Fig. 2) within the Price Monitor databases. The data collected by the Price Monitors 10 and stored in databases can be sent in response to either automated or manual calls from the Dynamic Price Manager 50 and the Analyst Workbench 60 via Extensible Mark Up Language (XML) through a virtual private network (VPN) connected to the client's network systems or over the Web via FTP transfer.

The "Price Connector" 20 is a highly versatile software component that is integrated into the e-business client's web server and e-commerce platform to enable the substitution of test price bands for the standard or set price of a selected product. The Price Connector 20 shown in Fig. 1 is a SOAP connector. However, the Price Connector 20 can be written in the same computer language as the client's existing e-commerce platform (e.g., C++, Perl, Visual Basic, Java) to integrate efficiently and create a small footprint on the client's site.

Alternatively, the Price Connector can be implemented to use other protocols (e.g., COM/DCOM, CORBA, or RMI). The Price Connector's main purpose is to request a substitute price for web site visitors that are eligible to be part of an approved pricing scenario, test case, or price monitoring sample. The request is sent from the e-commerce site through the Pricing Engine 80 and into the Dynamic Price Manager 50 which selects a random price from the specified price band for delivery back to the site visitor. Execution time for this operation is very fast, ensuring that the customers receiving prices from the Dynamic Price Manager are unaware of their involvement in a different pricing process within the e-commerce site. The Intelligent Pricing Solution's Price Connector 20 may support all standard Internet security functions through the standard encryption technology of the Secure Socket Layer (SSL).

The "Customer Behavior Monitor" 30 is the Intelligent Price Solution's tailored web log file analyzer. The Customer Behavior and Site Monitor 30 may operate in two distinct modes. The first mode shown in the current embodiment of the Solution in Fig. 1 is that of a log file data mining tool which reads the server or cluster of servers log files to parse out valuable information on the activity of the web site visitors and customers. The Customer Behavior and Site Monitor 30 provides clickstream analyses of segmented visitor activity on the site, including the examination of entrance and exit pages as well as visitation statistics for specific pages and paths. Details on top search engines, key words and key phrases used by visitors accessing the site are available. The product also analyzes market baskets activities and calibrates brand/product profitability and attractiveness. Registered visitors and visitors who were served a test price by the Dynamic Price Manager can be individually tracked and their clickstream, information gathering, and shopping behavior noted and clustered with similar visitors. The Customer Behavior and Site Monitor can evaluate the effects of banner ads, web site specials, and promotions and perform return on investment analyses.

The second mode of operation is the live Customer Behavior Monitor, which enables remote real time capture of visitor clickstream behavior and purchasing preferences. Embedded sections of Java code edited or placed into the e-commerce web site pages communicate clickstream activity and visitor behavior around products and prices to the Intelligent Price Portal 40.

Both embodiments of the Customer Behavior and Site Model provide a set of standard web site analysis reports on an hourly or daily basis. A commercially available statistical reporting package such as SAS™ may be integrated into the Customer Behavior and Site Monitor to provide analytical capabilities. Alternatively, the algorithms use for analysis may

be coded into the specific deployment of the product. The reports can be tailored for the specific website server operation and be set to capture customer responses to specific marketing information banner ads and promotions. Additionally the Customer Behavior and site monitoring data is captured and maintained in a database enabled with Online Analytical Processing (OLAP) query capabilities. All reports and OLAP queries can be presented to through the solution interface (see Intelligent Price Portal 40) and Executive Price Portal 90 as well as being designed for communication via e-mail alerts. The output of the Customer Behavior and Site Monitor can also be utilized by the statistical applications in the Workbench 60 to develop predictive models of customer behavior on the site.

Referring to Fig. 3, the "Intelligent Price Portal" 40 is the home portal for the Intelligent Pricing Solution, providing users with access to daily pricing news and information on specific industry pricing trends and articles of note. It serves as the ASP for the Price Monitor 10, and is the location from which client analysts and executives can execute OLAP queries on the Price Monitor 10 as well as Customer Behavior and Site Monitor 30 databases. Users can also update models and analysis frameworks and tools for use in the various Intelligent Pricing Solution applications from the Price Portal.

The "Dynamic Price Manager " 50 enables e-businesses to design and set up pricing and product bundling prices as scenarios, test cases, and monitoring samples. Pricing scenarios, test cases, and monitoring samples are developed using a wizard-driven graphical user interface (GUI) that establishes a flexible and extensible system driven by business rules and corporate strategy objectives. The segmentation interface is tailored for each client during the deployment of the solution. While generalized default business rules are programmed into the interface, clients can easily develop their own business rules as driven by corporate strategy. Examples of business rules include:

- Conduct scenario tests for a range of prices for Product A at 10 percent below current prices.
- Conduct an ongoing monitoring scenario for 10 percent of all .edu (education domains) visitors, serving prices for all products that are 3 percent below list prices.
- Serve 1 in 10 registered .com customers with a special coupon offering a 15 percent discount on products SKUs A, B, and C.

Clients can use the pre-programmed pricing scenarios for which automated parameters for statistically valid sample sizes, price bands, and timing, based on average number of visitors and other criteria, are set based on easily adjusted business rules. For more skilled

professional pricers and business analysts, the test parameters can be set manually to reflect a specific business strategy.

Figs. 4 and 5 are exemplary screen views for the dynamic price manager's segmentation and sampling functions. Using the segmentation function, a user may designate products to be price tested in window 410, along with specific customer segmentation criteria (windows 420a, 420b and 420c). Using the sampling function, the user may designate start and end test dates (windows 510 and 520, respectively); sample frequency (window 530); and quote lifetime (window 540). A person of ordinary skill in the art would appreciate that other test criteria could readily be added to these, to provide further detail as to the parameters of the test to be conducted.

Fig. 6 shows an exemplary screen view allowing establishment of a test case by a user. Clients can enter price bands in windows 610, 620 corresponding to percentage above and below base price. In addition, test case modifiers can be selected for dollars and cents in windows 630a, 630b and 630c and 640a, 640b, 640c, 640d and 640e.

The Intelligent Pricing Solution and the Dynamic Price Manager 50 contain flexible and rapidly customizable automated approval workflow capabilities for control and security. When pricing analysts create suggested price and product scenarios on the Dynamic Price Manager 50, the scenarios, tests, and monitoring sample descriptions can be sent via e-mail to a list of managers and executives for approval, review, or information. Constructed scenarios cannot be launched unless approved by pre-defined managers or executives. This definition is done during installation of the Intelligent Pricing Solution on the client site.

Once a scenario test case or monitoring sample is created and approvals granted and the case is deployed, the Dynamic Price Engine 80 dynamically serves test prices or monitors selected prices served to randomly or selectively determined web-site visitors/customers that fit the defined criteria and select a product or bundle of products currently designated as "in monitoring or test mode" on the subject e-businesses site. The Dynamic Price Engine 80 ensures that the test price is consistently served to the selected visitors until the visitor either leaves the site or completes his/her purchase of the product and during the quote lifetime. Quote lifetime is a specific parameter for the cookies lifetime that is set in the design of the monitoring or test scenario. Serving of consistent prices to the same customers is done by setting a cookie onto the visitors' computers or utilizing visitors' logon information (if registered) such that if a visitor leaves and returns within some specific period (e.g. 30 days) the same price is served to the visitor. If a visitor leaves and returns to the site within a defined

period (e.g., 30 days, a period often defined by company policy regarding the valid time period for which a price quote will be honored), the same price is served to the visitor. The cookie is programmed to be active for a specific period: it expires when the defined period is over.

The increasing pace of change on the Internet suggests that many Intelligent Price Solution users may wish to enable the Dynamic Price Manager 50 to monitor visitor and customer price sensitivity on an ongoing basis. For example, a statistically valid sample of customers in a target segment might be continuously tested/monitored for a specific price range that is between 3 percent under list and 5 percent over list price for specific products.

Information about the scenario, test case, or monitoring sample visitor/purchaser is recorded in the Intelligent Pricing Database 95. Multiple monitoring/test samples can be run simultaneously and data from an ongoing test/sample (e.g., number of visitors served test prices, number of actual purchases, active dates for the test period, etc.) can be called up for reports at any time. The Dynamic Price Manager 50 can be placed on an application server in the midst of the e-business' web site or it may be accessed remotely in an ASP mode. The Dynamic Price Manager scenario tests/samples can also be employed on a corporate Intranet or via broadband/wireless communications to hand held devices. The results of each test/sample is provided in a format compatible with commercial spreadsheet applications and includes a set of standard analysis, including segmented customer price preferences, product price elasticity (see Fig. 7) and competitive cross-price elasticity (when deployed in conjunction with the Price Monitors 10), product margin and revenue analyses, and price band results. Fig. 8 shows a percent profit over breakeven value for a fictitious test case for "Ziamax."

The "Dynamic Pricing Engine" 80 is a component that is located on an application server at the client's site or at the home site when the system is provided in an Application Service Provider (ASP) mode. The Java server is integrated with the client's e-commerce system through the Price Link Connector 20. Once the Price Link Connector 20 responds to the website visitor's selection of a specific product, the Dynamic Pricing Engine 80 coordinates with the Dynamic Price Manager 50 to serve the test price randomly selected for the specific visitor. The server also acts as a client with respect to the underlying database engine of the Dynamic Price Manager 50 that holds the case created by the pricing analyst and approved by the user's supervisor.

The "Price Analyst Workbench" 60 provides a set of automated models and analytical tools that enable users to analyze and model price and promotion-related customer price tests.

Workbench analytic tools provide meaningful business correlations and trends by integrating price elasticities from the Dynamic Price Manager 50 with customer clickstream information and back office customer data, such as customer profiles, order entry reports, sales, marketing, and accounting files. Cross price elasticities may also be calculated with input from the Price Monitors 10. While the Workbench provides several standard price optimization tools and models, more advanced data-mining reports can be configured to meet specific user needs. The Workbench 60 uses best-of-breed data-mining tools (e.g., neural nets, genetic algorithms,) to build proprietary models for analyzing and forecasting pricing effectiveness. Examples of these models include price elasticity and cross elasticity models, market and sales forecasting models, market basket analysis, and other pricing and predictive models. In addition to the standard price analyses and site statistics, the Workbench 60 with inputs from the Customer Behavior and Site Monitor 30 can be tailored to provide statistics on banner ad campaigns, website specials, and promotions. It also can enable tracking and evaluation of the acceptance of different prices along a specific product's pricing band as set by the Dynamic Price Manager 50. Models and analyses can be configured for specific client e-business operations at the customer site, or the customer and log files can be sent across the Internet via a Virtual Private Network (VPN) when delivered in an ASP mode.

The "Profile Wizard" 70 provides an interface for the company's pricing analysts and/or product managers to develop clear "profiles" or data-driven descriptions of different types of customers for which the e-commerce site may have already segmented by size, type of customer, or other criteria. The Profile Wizard 70 customer descriptions include data from the post-price test analysis of customers' price choices drawn from the proprietary database in the Dynamic Price Manager 50 and may include demographic or firmographic profiling. The objective of Profile Wizard 70 is to enhance the analytics provided by Dynamic Price Manager 50 with customer profile information stored in the client's enterprise-wide "BackOffice" databases, web navigational profiles captured by Customer Behavior and Site Monitor 30 and third party databases. The Profile Wizard 70 can make API calls into the client's back office databases to collect data from enterprise databases or data warehouses. The descriptive power of the resulting individual customer profiles is limited only by the fields contained in the web customer registration, clickstream history, back office databases or third party demographics used as inputs available to the pricing analysts using the Profile Wizard 70.

Price Monitor Product Functions and Benefits (Inputs, Activity, and Outputs)

The Price Monitors 10 provide competitive intelligence information, historic pricing data, and analytic capabilities to clients. The Monitors' functionality provides a basis for vertical industry competitor products' price monitoring (e.g., Web pharmaceuticals, financial trading institutions, auto parts, etc.) that have yet to be developed, and thus should be viewed as extensions of the existing Price Monitors. Any new functionality added to Price Monitors 10 will instantly extend the functionality of the entire suite of products.

A Price Monitor's three primary functions are as follows:

- 1) New product, price, and promotions information intelligence gathering, followed by the presentation of the results to registered and named clients;
- 2) The maintenance of price and promotion histories within a set of proprietary databases; and
- 3) Interactive product price analysis and charting including time series reports and graphs, comparisons of selected sets of products by different manufacturers and/or vendors, price normalization, and test price configurations.

These operations are distinct and separate for specific vertical industries. Within each vertical industry (e.g., computers, peripherals, pharmaceuticals) for a specified set of products or services, the Price Monitor 10 scours the web sites of competitors, pulling in and parsing out detailed product, pricing, promotion, and configuration information. This information is filtered and parsed to remove extraneous information and then is stored in a relational database and published via the Intelligent Pricing Portal or as XML responses to data requests. Dynamic Price Manager 50 provides companies with an integrated pricing management tool that supports strategic pricing decisions for dynamic, one-to-one pricing on the Internet and provides a bridge between online, offline, and channel pricing.

The individual vendor product pricing, configuration, component parts, prices, and promotion information is permanently maintained in one of the Intelligent Price Portal's 40 databases, establishing a lasting historical record of price change and new product introduction events.

In a preferred embodiment, the system maintains a secure web site (the Intelligent Pricing Portal) from which competitive pricing information and analyses are provided via XML feeds to authorized named clients for their Intelligent Price Solution installation. The Price Monitor historic database offers several views of the information gathered including by-product line; in user defined comparison sets, graphically via historical price charts, and

detailed listing of price product component price changes. Named clients can individually select products for comparison, establish normalized product masters and normalize and store sets of product comparisons in the databases. The browser-based interface enables clients to easily navigate the site, gaining quick access to the exact information and analysis they require. In addition to accessing the pricing data via website, clients can also arrange to download XML or Excel files of specific pricing data from the Intelligent Price Portal.

The Price Monitors' 10 current functionality may also provide access to historical competitive pricing information to customers via data feeds. Customers using browser-based data may require downloads of the data for use with in-house proprietary pricing models and analyses. For example, an external shopbot client that has its own proprietary graphical interface for competitive pricing information might desire a feed of Price Monitor data. The format of the data used to transmit competitive pricing information can be an open standard such as eXtensible Markup Language (XML). In addition, selected downloads of information from the database may also be available to named users in Excel spreadsheet format or any other desired format.

Customer Behavior and Site Monitor Product Functions (Inputs, Outputs and Benefits)

The Customer Behavior and Site Monitor 30 examines customers' response to online pricing, enabling the acceleration and enhancement of pricing decision-making with highly accurate information on customer behavior. More in depth than standard log file monitoring software, the Customer Behavior and Site Monitor30 provides sophisticated statistical analysis and models that explore the impact of pricing changes on consumer behavior.

The Customer Behavior and Site Monitor 30 functions in two distinct ways. First, it acts as a data mining tool, reading server log files to extract relevant information about the movement of site visitors. The second function of Customer Behavior and Site Monitor30 is a live tool that enables the real time capture of site visitor activity.

The first function examines and tracks clickstream activity on the site through an in-depth investigation of web server logs. Entrance and exit pages, specific field paths and banner ads click through rates are just a few of the areas of the e-commerce site that can be tracked. Clients can also monitor the navigation behavior of customers who are served a price by the Dynamic Price Manager 50. The outputs collected from the server form the basis of the analysis performed by the Customer Behavior and Site Monitor30. Using this information,

clients can then segment customers, determine return on investment, and ensure overall site effectiveness.

The ability to track real time customer clickstream represents the second function of the Customer Behavior and Site Monitor³⁰. This live format requires an adjustment to the client's embedded e-commerce website code. Upon the placement of these code lines, the navigation of site visitors feeds directly back into the Intelligent Pricing Portal ASP. This allows the client to capture immediately customer response to price promotions or site alterations. As with the first function of the Customer Behavior and Site Monitor³⁰, various elements of the e-commerce site can be observed. Similarly, this function of the Customer Behavior and Site Monitor³⁰ also allows for several levels of analysis, the only difference being the nature of the data. Unlike the first function, the real time version of the Customer Behavior and Site Monitor³⁰ examines real time, not historical data. This permits an up to date analysis, and a more accurate elimination of extraneous factors.

Some of the specific outputs of the Customer Behavior and Site Monitor³⁰ include:

1. Monitoring and tabulation of daily web site activity
2. Segmentation of online visitors by business types, pricing behavior, domain, or other unique identifying characteristics
3. Identification of site visit, traffic, and purchase patterns
4. Segmentation of site traffic by page visit and purchase history
5. Identification of referrer sites and percentage of online visitors from each referrer
6. Feeding of resulting data into Profile Wizard ⁷⁰ and Pricing Analyst Workbench ⁶⁰ to create sales and marketing models, scenarios, and what-if analyses

Some of the benefits of Customer Behavior and Site Monitor³⁰ include:

1. Better understanding of response to pricing by tracking customer behavior on Web
2. Analysis of activity on site
3. Testing of effectiveness of banner ads, specials, and promotions
4. Use data to adjust site architecture and pricing strategies
5. Forecasting of future customer behavior and response to pricing strategies

Dynamic Price Manager Functions and Benefits (Inputs, Activity and Outputs)

The Dynamic Price Manager's ⁵⁰ main function is to create scenarios and tests for a variety of prices, price bands, and bundles by substituting the test price for the stated price as

directed by the user in creating a test case, scenario, or monitoring sample. The interface of the Dynamic Price Manager 50 allows the user to design unique price bands, or to choose from among several generic test cases (e.g, create test band 10% above and 10% below current price). The Dynamic Price Manager provides status reports on the tests that are in process by indicating the number of customers for the test products as well as the number of test prices served to the sample set. When a customer matching any test criteria selects a product under test, the Dynamic Price Manager 50 matches the test and includes the customer into the test by serving the customer an individual test price and a persistent, uniquely identifiable cookie. The purpose of the cookie is to ensure that, even if the customer does not select the test price, whenever the visitor returns s/he will receive the same test price for a specific client-determined time period. Additionally, the cookie enables the price analyst to track the visitors' click stream behavior on the site. The customer profile data from each prospective customer's visit to the site, the customer segment they belong to (if they are registered or if the site funnels them into a segment via the site design), their choice to purchase or not, and any history of repeat visits after the initial visit are stored in the Intelligent Pricing Solution Database 95. The contents of this database are automatically downloaded daily or on demand by the price analyst and may be stored either on the client's web site or the Intelligent Pricing Portal databases for eventual analysis by Profile Wizard 70 and Workbench 60.

The Dynamic Price Manager 50 provides detailed statistical analyses of the price and promotion-related tests as outputs in charts, graphs, as well as price quotes and purchase responses detail data. Examples of the pre-programmed outputs include tables, bar charts, pie charts, histograms, waterfalls, and plotted reports on the product or products considered in each test, including:

1. Summary data tables showing the number of products tested, the sample size for each product, the number of customers who elected to purchase as well as those who chose not to purchase;
2. Table of prices and corresponding elasticity
3. Chart graph of estimated elasticity vs. price
4. Chart graph of estimated cross elasticity (for a each selected competitor) vs. price
5. Chart graph of estimated cross elasticity vs. price for all selected competitors
6. Product price elasticity and cross price elasticity values;
7. Product or bundle margin analysis;
8. Product impact on revenue (or revenue neutrality);

9. Price Band Distribution Chart – Line Graph with current and optimized price distributions.
10. Contribution margin distribution chart;
11. Revenue distribution chart;
12. Break even sales distribution chart;
13. Profit changes relative to current profit level chart

The original and calculated data appears in a spreadsheet format and can be saved by the user to their local hard drive as an MS-Excel file. Bar Charts will have a bar for the “Current” and “Optimized” scenarios for each of the following (if the appropriate data has been entered) Price, Sales Volume, Revenue and Profit.

Dynamic Price Manager 50 data can be combined with the client web server log file analyses and/or Customer Behavior and Site Monitor³⁰ data to provide business correlation's and trends by integrating web traffic information with traditional business data such as customer profiles, order entry reports, sales, marketing and accounting files.

Price elasticity can be extracted from test results so that optimal price or price bands can be determined for specific business goals such as “Increase sales by 1 percent.” With inputs from Price Monitor's capture of competitor prices for the products being tested, the Dynamic Price Manager 50 can also be used to calculate cross or competitive price elasticity.

Some advantages of Dynamic Price Manager 50 include the following:

1. Provides a price monitoring and testing tool for clients who do not have sufficient or available historical price changes and sales data that are required for accurately estimating price elasticity;
2. Tests or monitors real time price response so that price elasticity and cross-price elasticity (based on availability of competitor prices) can be dynamically estimated;
3. Dynamically determines optimal prices within the pre-specific price band; according to desired business goals;
4. Estimates product margins and optimal prices and numbers of units to maintain or improve margins;
5. Provides test results to refresh product pricing models developed in Business/Price Analyst Workbench 60;
6. Creates basic price elasticity models to provide clients with pricing solutions for complex business constraints without pre-specific price band. (Note: price

elasticity models generalize the test results to a broader range of prices for searching optimal pricing points);

7. Provides a means for ongoing price monitoring for defined segments or product price bands on the clients e-commerce site.

More advanced Dynamic Price Manager 50 analytical reports are customized for each client. In addition to the standard site analysis statistics, Dynamic Price Manager 50 can provide statistics on banner ad campaigns and promotions and enables the client to track and evaluate acceptance of different prices along a specific product's pricing band. The response of clustered and segmented customers to different price points can also be tracked and evaluated. Clients can populate tables with lists of the banner ads and promotions that are being offered so that they may be tracked as a group (e.g., all ZDNet Banner Ad) and specifically tracked as a named ad within the group (e.g., Banner Ad Crazy Crew A at \$399 and Crazy Crew B at \$359).

Profile Wizard Functions (Inputs, Outputs, and Benefits)

The Profile Wizard 70 uses a secure type of profiling individual customers that avoids the linkage of credit card numbers to the customer registration or the unique customer identification found in the persistent cookie placed onto the systems of price test/monitoring customers. There is usually no need to set a cookie for registered customers, since their information may be correlated to their registration information. Furthermore, the Solution requires its clients to explicitly state and ensure that all personal data from customers has been acquired and shared with the full knowledge and agreement of the individuals or companies.

Profile Wizard Inputs

Examples of the type of personal company-specific data that may be shared include the following:

1. Registration data (e.g. , name, address, phone numbers, company name, age, income, revenue & sales numbers, etc);
2. Past purchases by item, value or both;
3. Frequency of purchase;
4. Timing of purchase;
5. Length of trading relationship;
6. Gender of customer;

7. Customer SIC code;
8. D&B Profile data;
9. Area of origin, including promotional regions: TV areas, local radio and media areas for example;
10. Source of enquiry;
11. Price responses captured by Dynamic Price Manager 50;
12. Site activity captured by Customer Behavior and Site Monitor30;

The purpose of the customer profiles developed using the Profile Wizard 70 is to develop a very clear image of customers and to group or cluster them according to types. These types may include groupings such as high spending and regular customers, irregular and high spending customers, regular users and low spending customers, irregular and low spending customers, and bargain hunters and price sensitive customers.

Alternatively, customers may be grouped by origin, value of spending, type of product, or other ways that will help users market to them effectively. The overall objective is to make the customer groupings, clusters, or segments more valuable and actionable by applying the most appropriate pricing strategy to each.

Profile Wizard What-If Scenarios

With the segmentation data available from the Profile Wizard 70, the user determines which segment they would like to use in performing additional elasticity estimations from the Dynamic Price Manager 50. In this application, the user enters price scenario parameters and gets the resulting sales, revenue, and profit levels as output. A scenario "own" price output defaults to a table including current and scenario sales volume, revenue, and net profit contribution. The user can then select to view comparison bar charts for the current and scenario sales volumes, revenue, and profit levels.

Profile Wizard Customer Segmentation Capabilities

Profile Wizard 70 examines all available profile fields and produces summary statistics to assist users to select fields that can be used to effectively segment customers. Summary statistics that will be used to determine the importance of profile fields are described as follows:

Numerical profile fields:

Calculate the mean, median, standard deviation, minimum, maximum, and the coefficient of variation.

Let x_i be a batch of observed profile field values.

- Mean is defined as $\bar{x} = \frac{\sum_i x_i}{n}$.
- Standard deviation is defined as $s = \sqrt{\frac{(x_i - \bar{x})^2}{n-1}}$, where n is the total number of observations for the particular profile field.
- Minimum and Maximum are defined as the smallest and the largest value in a batch of numbers respectively.
- Median is defined as the value such that half of the observations are less than or equal to it, and half are greater than or equal to it. The median is used to indicate where the center of the data is.
- Coefficient of variation is defined as $CV = \frac{s}{\bar{x}}$, where CV is a figure representing what percentage the standard deviation is of the mean. The larger the CV , the more diverse and variable the data.

CV is used as a measurement of the importance of a profile field that can be used to effectively segment customers. Thus, profile fields should be ordered by CV in descending order to assist users for field selection. The system shall explain the relevance of this value and make it visible to the users.

Character fields:

The system shall calculate the relative frequency of each category and the entropy (i.e. information) of the profile field.

Let n_{ci} be the total number of observations that belong to category ci and n be the total number of observation.

- The relative frequency of category ci is defined as $f_{ci} = \frac{n_{ci}}{n}$.
- The entropy is defined as $E = -\sum_i f_{ci} \cdot \ln(f_{ci})$

The larger the entropy, the more diverse and variable the data. Similar to *CV*, the character profile fields should be ordered by the magnitude of entropy in descending order to assist users for field selection. Similar to the numeric fields' case, the system shall explain the relevance of this value and make it visible to users.

Rule Based

Profile Wizard 70 enables users to merge profile fields from all sources and manipulate (specify) their values to create segments, based on their insight or experience on each of the profile fields. Profile fields and their values can be selected from different source lists. For numeric fields, the users are able to specify the range of interest (e.g. >\$500 or <\$900). For class variables, a specific value or a combination of specific values can define a segment (e.g. For the Field "Color" the user may specify "Blue" or "Blue and Red" as the segmentation criteria). The user will be allowed to assign descriptive segment names and save these segments for later use. Note that all customer segments are mutually exclusive: condition checking needs to be implemented so that no two segments can overlap.

Statistical Clustering

Profile Wizard 70 enables users to perform statistical clustering algorithms that estimate the statistical distance between customer profiles to measure the similarity between customers and group them into segments.

Profile Wizard 70 is capable of performing K-means and neural network (Kohonen Net) clustering. Summary statistics as well as statistical charts will be produced to describe the resulting customer segments. To be specific, segment means, medians, standard deviations, min and max, and/or category relative frequencies of each profile field defined by the segment as well as profile distribution charts can be used to describe the attributes of resulting segments. Users are able to select between performing this analysis on data within OLAP or relational architecture if OLAP architecture is available.

OLAP

Profile Wizard 70 enables users to perform price-response driven customer segmentation by utilizing user selected customer profile fields as well as corresponding customer purchase response data captured by Dynamic Price manager 60. In other words, customers are grouped according to (or directed by) type of price response. Since customer

segments are driven by customers' price responses, they can be thought as customer "pricing" segments.

OLAP is an acronym for online analytical processing. OLAP has evolved as users' needs for data analysis has grown. It provides executives, analysts and managers with valuable information via a "slice, dice and rotate" (i.e. drill-down) approach for end user data access, augmenting or replacing the more complicated relational query. This slice and dice method gives the user consistently fast access to a wide variety of views of data organized by key selection criteria that match the real dimensions of the modern enterprise.

OLAP performs multidimensional analysis of enterprise data including complex calculations, trend analysis and modeling. Derived from end-user requirements, OLAP enables end-users to perform ad hoc analysis of data in multiple dimensions, thereby giving them the insight and understanding they need for better decision making.

Users are able to select from the available profile fields as well as test price points as the "dimensions" of the multidimensional database (called data cube). Customer price responses (purchase likelihood, units purchased, and dollar spent) will be used as the summary measure variables of the data cube. Additional measures may include financial metrics from Dynamic Price Manager 50 analytics.

Once the data cube is created, users will be able to drill-down any of the dimensions defined in the data cube and examine customers' price responses on the aggregation level defined by the current drill-down level. Dimensions as well as the levels of drill-down that significantly differentiate customers' purchase responses are then determined. Furthermore, the levels of drill-down also determine customer segments with different attributes of price responses.

Profile Wizard 70 shall enable the user to score other purchase response data sets using OLAP defined segmentation rules.

Decision Tree Model

If the user selects the tree model segmentation application in the Profile Wizard 70 the application uses the available profile data (from Dynamic Price Manager 50 and Back Office Database 90) to execute a decision tree algorithm based on the selected Dynamic Price Manager test results (served price and purchase observation).

The resulting decision tree is output to the tree model segmentation screen. The user has the option to save and print the decision tree.

The user can also select to save the segmentation that is defined as a part of the decision tree algorithm. Each tree node is classified as a segment and as a result each test record is labeled as belonging to the appropriate segment. A field segment field is added to the test data set. This field is a class variable (it can have many discrete values where each value corresponds to a decision tree segment). The test data set (served price, purchase observations, and the new segmentation) can now be used to fit the models described above based on the newly assigned segmentation.

The user can select to perform the model fitting procedure on the test data with the newly assigned decision tree algorithm segmentation.

Pricing Analyst Workbench

The general purpose of the Pricing Analyst Workbench 60 is to provide an open, extensible interface for operations carried out by the price elasticity, cross price elasticity, marketing models, scenarios, and predictive applications. The inputs for these models may include customer and business profiles, XML files of competitor data, and unit sales and revenue information for one or for a bundled set of products.

The output may include product price bands or specific target prices that can be linked to price-based analyses and profiles of individuals or clusters of customers. The analysis outputs will be provided in user-friendly format with clear indicators of the real world impacts and actions indicated by the various analyses. Examples of this would be simple prescriptive actions and directives that are generated through a highly intuitive user interface or "wizard" (e.g. "Price band for product A ranges from \$299 to \$310 with 65% of the customers in cluster A likely to purchase at first visit at the low price end (from \$299-\$302). Customers in Cluster B are likely to purchase at first visit at a price of \$307.")

The Profile Wizard 70 is capable of transmitting reports and outputs such as product-specific price band information to external software such as web servers, electronic catalogs, and Dynamic Pricing Engine 80. The Workbench has a small software footprint such that the software can be loaded onto web servers or placed in proximity to client web servers to enable dynamic real time pricing for individual products, customer clusters, or individual customers. For example, in one-to-one pricing, the output for the pricing band of a specific product can be constructed to enable the Dynamic Pricing Engine 80 to use the price in combination with the profile of a current active user to determine an exact price during the customer's unique session on the web server.

As updates to models and views become available, they are packaged and delivered to installations as an automatic self-extracting upgrade. Delivery should come in the form of automated requests issued by the remote site. Model and view updates may include but are not limited to directory structure information, statistical and analytical program scripts, and Java class files. The packaging of the updates should be such that remote processing is simple.

The models and views for each remote site will vary per installation. Additionally, the updates delivered must be controlled by a version management tool set and traceable to specific revisions. Possible solution technologies include Vignette's ICE protocol, J2EE WAR files, proprietary XML dialects, PVCS, and others. Components may include:

1. Price Sales and Profit Analysis
2. Bundle Component Attach Rate Analysis
3. Competitive Price and Sales Time Series Decomposition Indices Analysis
4. Rebate and Promotion Analysis
5. Optimized Price and Pricing Band
6. Price Elasticity
7. Definition of Pricing Rules and Constraints

Each analysis technique requires a separate user interface to receive user inputs and display the resulting analysis views. The inputs required will vary with the technique. Each technique may be able to generate numerous views of data. The following techniques will be supported in a preferred embodiment:

1. Price Sales and Profit Analysis
2. Bundle Component Attach Rate Analysis
3. Competitive Price and Sales Time Series Decomposition Indices Analysis
4. Rebate and Promotion Analysis
5. Optimized Price and Pricing Band
6. Price Elasticity
7. Definition of Pricing Rules and Constraints

The Workbench user interface will manage the relationships between the analytical models and their associated views. Each technique is related to a single model. Following the execution of the model, the user interface will manage the display of the various data views. A primary data view will be defined for each model. This view will be initially displayed and the interface will allow for user selection of the secondary views as alternates.

Dynamic Pricing Engine Product Functions (Inputs, Outputs, and Benefits)

The Dynamic Pricing Engine 80 software powers the various applications in the tool set. The server upon which the engine is installed will need to be in close physical proximity to the client's e-commerce web server(s). As pricing requests come into the client's web server; the server makes a call to the Engine, which then calls the Dynamic Price Manager 50 to dynamically determine the price. The Pricing Engine 80 serves the request by consulting the Dynamic Price Manager 50 test case. The engine server takes in information about the product and the price. If the product is one that is being tested and the client is one of the randomly chosen test/monitored clients, the Pricing Engine requests one of the substitute prices from the test product database resulting in a price quote. The quote from the database is then dynamically formatted into HTML in the same structure and design as the original set price. The client web server then processes the display result by showing the test price in the customer's browser window. The server processes the request by obtaining the application description from the Engine runtime system, and sending it as a sequence of display requests, including the visual look of the application and its logical structure (e.g., which prices will appear, the visual attributes of each of the data fields, where they are, length, color, etc.)

The inputs to the engine include, but are not limited to Dynamic Pricing Analyzer pricing band rules and constraints; customer or business profiles via the Profile Wizard 70 or via a commercial profiling software package (e.g., Net Perceptions); site log files and active clickstream history; and current shopping cart manifest.

Intelligent Pricing Solution Database

The Pricing Engine 80 reports operational events to remote administration applications either at the client site or to an ASP's Pricing Portal when delivered via the ASP mode. In addition to serving as the recording log of the Dynamic Price Manager 50 activity, it may also serve as the recording log of the clients' pricing band and price model applications. In addition, the Intelligent Pricing Solution database provides insight for administrators into the proper operation of the Pricing Engine 80 and the Dynamic Price Manager 50. Thus, if the engine is not performing optimally, an e-mail alert is sent to either the client operations manager or to the ASP's operations manager or both. The information sent via the e-mail alert will provide clues and diagnostic input regarding the performance problem and suggest corrective action. In a preferred embodiment, the operational event log will include the following:

1. Total number of dynamic price requests;

2. Number of successfully served dynamic price requests;
3. Number of unsuccessfully served dynamic price requests;
4. Time stamped log entry upon reception of new pricing band rules and constraints;
5. Per product per request;
6. Product identification;
7. Input price;
8. Customer profile identification;
9. Pricing band;
10. Segment;
11. Price returned;
12. Success status; and
13. Time stamp.

Executive Price Port (Inputs, Activities and Outputs)

The "Executive Price Port" component of the solution provides reports and results from the monitoring, testing and analyses of the other components of the Intelligent Pricing Solution. Additionally it provides financial analyses based on the results of the data and analyses drawn from the other components such as product and product line margin analyses, predictive revenue impact analyses and other strategic pricing reports. Inputs can include result and alerts from monitoring and testing cases from the Dynamic Price Manager 50, competitive prices from the Price Monitor(s) 10 and the cross price elasticities of competitive products and selected products under test or monitor status, customer visitation and visit to purchase ratios and other customer behavior and customer value indicators from the Customer Behavior and Site Monitor 30, as well as the results and predictions from models built with information from the Profile Wizard 70 and the Price/Business Analyst Workbench 60 can be made available on the Executive Price Port.

User Characteristics

The overall expertise of the Intelligent Pricing Solution user community will need to be relatively sophisticated with a strong awareness of the company's strategic and tactical product pricing goals and objectives, as well as an understanding of the impact of price changes on revenue and margin. The user community can be segregated into the following distinct groups:

A. Executives Users, General Managers, VPs, and Directors in Sales and Marketing positions who will establish business goals and objectives for use within the Solution, access and monitor the Solution's reports such as price bands and the outputs of models, analyses, scenarios, and forecasts, and utilize the reports and other information provided to assess the effectiveness of alternative pricing strategies and the organizations making the pricing decisions;

B. Business and Pricing analysts will use the Solution to determine price bands, set prices and monitor results from customer clusters or individual users based on profile and personalization information. Analysts will also set pricing and promotional experiments to test customer response to pricing and monitor the effects of his/her pricing actions using the Dynamic Price Manager 50 reports;

C. Product Managers will be able to track and optimize life cycle pricing of specific products, to set, test, and monitor price bands and prices for products, promotions and bundles;

D. Web Site Managers, Administrators and Developers will invoke the Dynamic Pricing Engine 80 to enable dynamic pricing activity on an e-business site;

E. Individual Customers and Businesses will be responding the output of the pricing Solution either in the process of purchasing goods or services on a site using the Solution; and

F. Personalization Engine, Market Exchange Engine, and E-Commerce Platform Software Vendors will use Solution to enable their new or existing customer base to provide one-to-one dynamic pricing on e-commerce sites or with intranet solutions.

Client users will be generally well versed in the pricing history of their own products and those of their competitors. They will have intimate knowledge of the characteristics of those products they are analyzing. Their knowledge concerning actual pricing analysis modeling may vary more widely from those with extensive experience in statistical modeling to those with little experience. The input interfaces and reports are designed to convey details of the modeling and make interpretation of the results intuitive.

The users will have a very good working knowledge of web page construction and web site operations. They will understand dynamic web page construction and be able to make external calls during construction to include a dynamic price in the page. There may be another community involved in maintaining and administering the engine with respect to day-

to-day operations. This group will be comprised of experienced web site managers and seasoned tool set administrators.

The components of the Intelligent Pricing Solution have the ability to create and distribute reports in multiple formats using an easy and intuitive report design wizard, which allows for the quick creation of custom reports. Reports can be generated in Microsoft Word, HTML, ASCII and e-mail formats. Reports and raw data can also be output to Microsoft Excel spreadsheets or as XML data reports. Reports can be automatically e-mailed or posted to users in text or database formats for easy interpretation and executive reporting. The Intelligent Pricing Solution can be tailored to allow client-specific report headings and tailored to provide custom reports and analyses using financial data and other company specific information. This tailoring is done during the implementation of the solution. The report text element can also be replaced with company-specific terminology, or translated into a foreign language using an integrated language manager.

Sold as individual components or as an integrated system, the Solution is designed as an open platform system using Java technology and Enterprise Java Beans and thus can be deployed in several fashions:

- 1) Deployed as integrated into commercially available or custom built web servers and e-commerce suites (e.g., Apache, Netscape Enterprise, Vignette Story Server, Broadvision, MySAP etc.) in conjunction with an application server such as Weblogic Tengah, Netscape Application Server, or others;

- 2) Deployed as a partial Application Service Provider (ASP) with only the Pricing Connector 20 and the Dynamic Pricing Engine 80 and Lab deployed in proximity to the client's e-commerce servers or intranet price servers;

- 3) Deployed entirely as an ASP using a virtual private network to communicate with the client's e-commerce/intranet server and back office systems with the Pricing Connector as the only component integrated into the client's e-commerce server; and

- 4) Deployed via an enterprise-wide Intranet for use with telesales and call center applications.

In a preferred embodiment, the architecture of the software is open, extensible and utilizes data and inputs from client e-commerce software, back office databases, and from industry-specific Price Monitors. Where possible, the system uses XML software standards and the software languages best suited to the client's e-business systems to ensure an open and flexible set of components and a small footprint on the client's front office site.

Enterprise or "Back Office" Database Interface

Back office database information is critical to performing detailed pricing analysis. The specific sources of this information will vary from installation to installation. In addition, as new analytic models are developed, new information will be required as well as the interface. Thus, at this point in time, an interface design, development, and deployment architecture is all that can be specified.

In order to maintain a flexible back office interface, the specific commands used to gain access to the data and/or the external format of the data must remain outside of the implementation code. Instead, these types of constraints must reside in environmental property files. This will allow for the development of an administrative data set up wizard that can be run during installation. The wizard will prompt the installer for the data sources and formats for the models being deployed. The results will be written to the property files. At any time, should the data sources or external formats change, the wizard could be engaged and the changes specified.

When the implementation wizard is initialized, it will read in the source and format information from the property files. As the analytic models are invoked, this information will be relayed to the model and it will be able to gain access to the information correctly. By abstracting the back office database variant from the model, making it static, and bridging the interface with an administrative wizard, the architecture remains flexible and is able to adapt to changing environmental conditions.

Primary Data Requirements

1. Daily sales transaction data (non-aggregated)
2. Type of product sold
3. Sold product final configuration (for price normalization purpose)
4. Date and Time product purchased
5. Business segment to which the sold product belongs
6. Payment type (e.g. leasing, credit cards)
7. Rebate usage indicator and amount if available
8. Shipping methods
9. Shipping Address (e.g. country, state)
10. Tax amount

Model Refreshing Data Requirements

The analytic and predictive models developed using the

1. Daily promotions data
2. Daily rebate indicator and amount
3. Promotions indicator and amount
4. Daily sales force data
5. Total number of headcount in sale force for the specified time period
6. Total salesforce expenditure (in dollars) for the specified time period (e.g. quarter, month, week)
7. Current and historical monthly or weekly advertising expenditure
8. Total ad expenditure dollars spent by specific product (break down by channels)
9. At least 6 months of historical monthly or weekly total ad expenditures dollar spend for ad effectiveness integrated elasticity models.

The transmission of competitive product information from the Price Monitor 10 to the Pricing Portal is designed to be secure and protected. Possible technology solutions include Secure Socket Technology and

Should be capable of operating on as many platforms as possible without requiring changes to the software code base or architecture. The current deployment vision suggests that the Solution either may be installed on an existing Application Server (Web Logic BEA) on the client's network or may be sold as a turnkey standalone system loaded onto a Web Logic BEA server. Maintaining cross-platform operational capability is a necessity.

The elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help improve the understanding of the embodiments of the present invention.

The foregoing discussion is included to demonstrate preferred embodiments of the invention. The techniques disclosed in the examples that follow represent techniques discovered by the inventor to function well in the practice of the invention, and thus can be considered to constitute preferred modes for its practice. However, many changes can be made in the specific embodiments which are disclosed and still obtain a like or similar result without departing from the spirit and scope of the invention.

REFERENCES

The following references, to the extent that they provide exemplary procedural or other details supplementary to those set forth herein, are specifically incorporated herein by reference.

1. Louviere, J.J. and Woodworth, G.G. (1983) "Design and Analysis of Simulated Consumer Choice or Allocation Experiments: An Approach Based on Aggregate Data," *Journal of Marketing Research*, 20:350-367.

WHAT IS CLAIMED IS:

1. Computer software for monitoring and testing pricing data for a product comprising:
 - a graphical user interface for obtaining monitoring and test parameters from a user for a test or monitoring case;
 - a dynamic pricing engine, wherein said pricing engine runs a test/monitoring case by offering a product for sale at a plurality of prices determined by at least some of said parameters;
 - a database for storing data corresponding to said test case, said data including offer information and sale information.
2. The software of claim 1, wherein at least one of said parameters is sample size.
3. The software of claim 1, wherein at least some of said parameters are price bands.
4. The software of claim 1, wherein at least one of said parameters is test or monitoring period.
5. The software of claim 1, wherein said software resides on an application server associated with an e-commerce website or intranet.
6. The software of claim 1, further comprising a database of generic test or monitoring cases to selectively supply at least some of said parameters.
7. The software of claim 6, wherein said generic test or monitoring cases include at least one generic test or monitoring case in which price bands range from a first predetermined level above a base price to a second predetermined level below a base price.

8. The software of claim 7, wherein said first predetermined level is equal to said second predetermined level.

9. A method of testing and analyzing pricing data in a computer environment, the method comprising:

establishing criteria for a pricing test or monitoring case, said criteria including a product under test or monitoring, a set of price bands relating the variance in prices to be tested or monitored, and a set of test or monitoring population requirements;

tracking activity on an e-commerce website or intranet site to determine if a customer having a computer qualifies for said pricing test or monitoring case in accordance with said test or monitoring population requirements;

if said customer qualifies, indicating that said customer will be deemed a test or monitoring participant;

offering said product for sale to said customer at a price generated in accordance with said price bands; and

collecting and storing sales information relating to a purchase decision issued by said customer.

10. The method of claim 9, wherein said indicating step comprises placing a cookie on said customer's computer.

11. The method of claim 10, wherein said cookie is persistent.

12. The method of claim 9, wherein said price is generated randomly in accordance with said price bands.

13. The method of claim 9, further comprising collecting and storing customer profile data.

14. The method of claim 13, wherein said customer profile data comprises a customer segment to which the customer belongs.

15. The method of claim 13, wherein said customer profile data comprises a history of repeat visits.
16. A method of evaluating product pricing in a computer environment, the method comprising:
 - establishing a first test or monitoring case wherein a product is offered at a first price to a first subset of customers;
 - collecting and storing a first set of data indicative of a first success rate corresponding to the frequency with which said product is purchased at said first price;
 - establishing a second test case wherein a product is offered at a second price to a second subset of customers;
 - collecting and storing a second set of data indicative of a second success rate corresponding to the frequency with which said product is purchased at said second price; and
 - comparing said first set of data and said second set of data for the purpose of making pricing decisions.
17. The method of claim 16, wherein said second test or monitoring case is generated automatically by software in accordance with a set of business rules input by a user.
18. The method of claim 17, wherein at least one of said rules is sample size.
19. The method of claim 17, wherein at least some of said rules are price bands.
20. The method of claim 17, wherein said software resides an application server associated with an e-commerce website or an intranet site.

Fig. 1

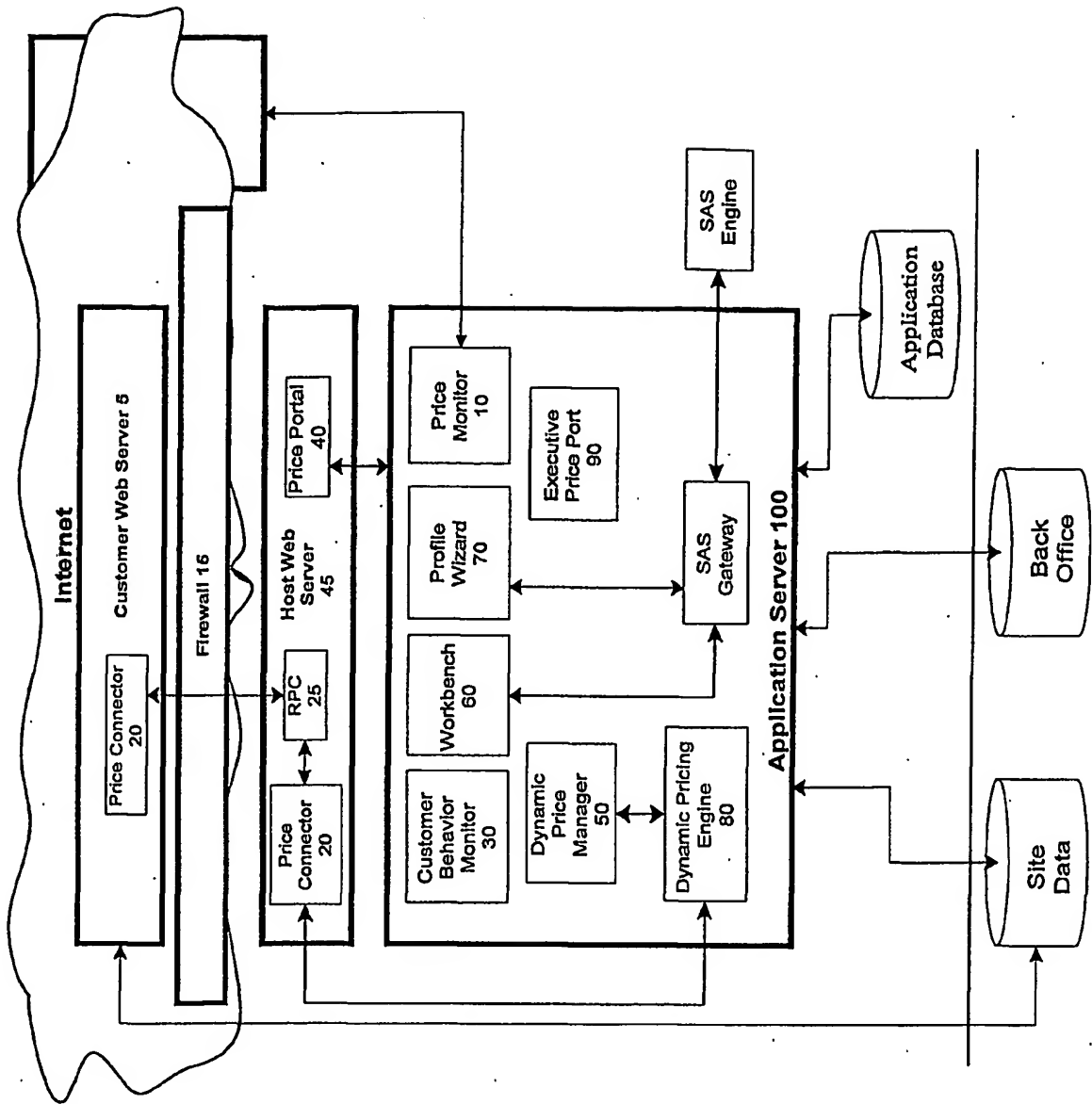


Fig. 2

Alphatec
Pricing right and prompt.

Computer Price Monitor

Products Comparisons Promotions

Desktops
Notebooks
Servers

Microtronics Dell Comparison Set

Component	Options	Chart	all	clear	Millennia EX Home (P11-420)
System					
	Last Change				87700
	Base Price				1,209
	Segment				Home Home
Processor	C-500				(100)
	C-533				50
	C-600				100
	P11-667				200
	P11-733				120MB
Memory	128MB				79
	128MB 100MHz (1-4mm)				192MB
	192MB				256MB (1-4mm)
	256MB (1-4mm)				310

Fig. 3

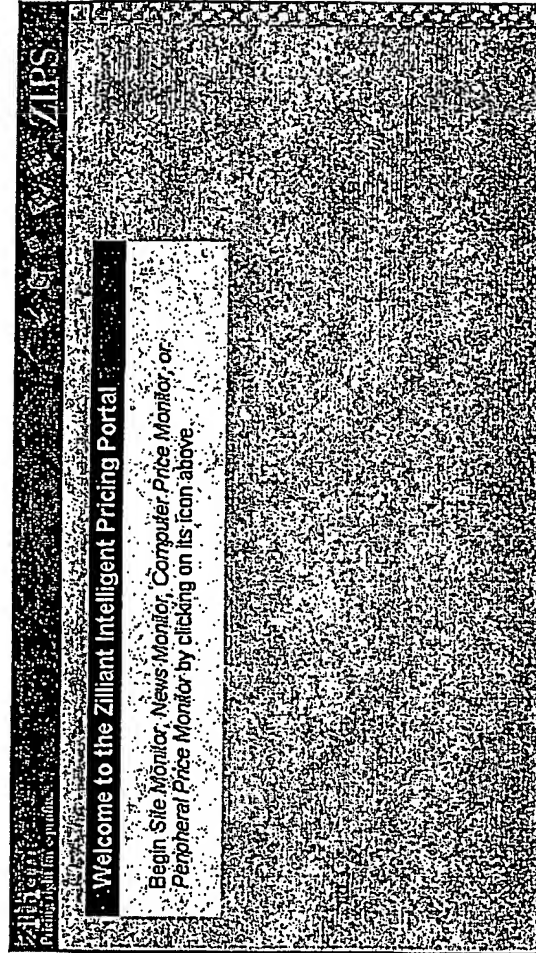


Fig. 4

ZiaMax
Dynamic Price Manager

ZIPS

Summary Edit Submit Display Delete

all Admin

Dynamic Price Manager

Products

Satellite 1050	
ZiaMax 7200	
ZiaMax 6500	
ZiaMax 5800	

Customer Segmentation

.com	
day (8AM-4PM)	
registered	

Fig. 5

Dynamic Price Manager

Summary

Sample frequency

Sample interval: 10

Test case start and end dates

Start: 6/20/2000

End: 6/21/2000

Quote Lifetime

Quote lifetime: 30

ZIPS

Fig. 6

Dynamic Price Manager

Summary Edit Select Deploy Delete Admin

all

2) Select Test Case Type

Price Band Type: Continuous using percentages

Percentage above test price	5	%
Percentage below test price	5	%

Select Test Case Modifiers

Price Normalization: ☐ None ☐ 10% ☐ Init

Price Modification: ☐ Exact ☐ Round ☐ Ceiling ☐ Floor

Sum over all a new Price Band Type

Fig. 7

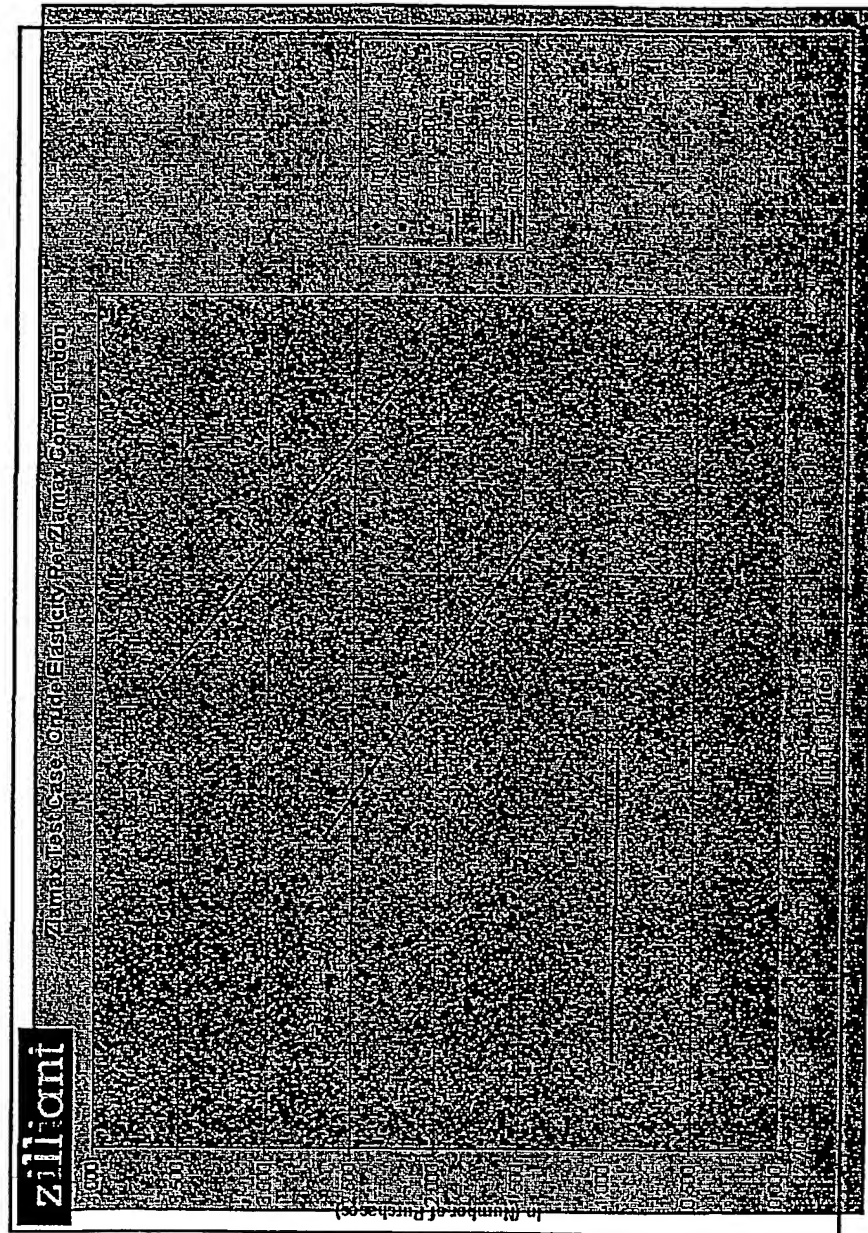
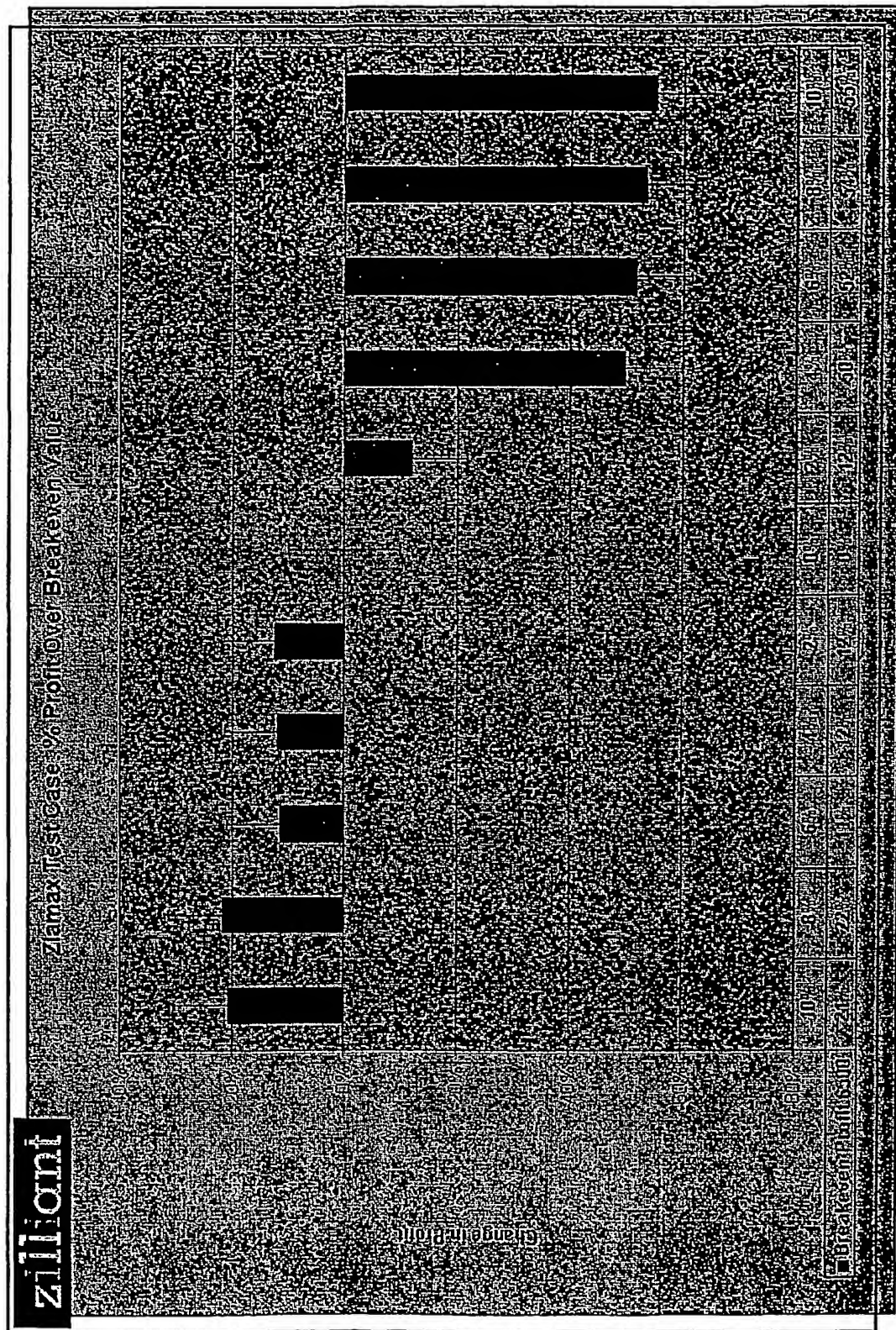


Fig. 8



PATENT COOPERATION TREATY

PCT

DECLARATION OF NON-ESTABLISHMENT OF INTERNATIONAL SEARCH REPORT

(PCT Article 17(2)(a), Rules 13ter.1(c) and Rule 39)

Applicant's or agent's file reference ZIL450/4-1A	IMPORTANT DECLARATION	Date of mailing(day/month/year) 02/10/2001
International application No. PCT/US 01/ 23375	International filing date(day/month/year) 25/07/2001	(Earliest) Priority date(day/month/year) 25/07/2000
International Patent Classification (IPC) or both national classification and IPC G06F17/60		
Applicant ZILLIANT, INC.		

This International Searching Authority hereby declares, according to Article 17(2)(a), that no international search report will be established on the international application for the reasons indicated below

1. ☒ The subject matter of the international application relates to:
 - a. ☐ scientific theories.
 - b. ☐ mathematical theories
 - c. ☐ plant varieties.
 - d. ☐ animal varieties.
 - e. ☐ essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes.
 - f. ☒ schemes, rules or methods of doing business.
 - g. ☐ schemes, rules or methods of performing purely mental acts.
 - h. ☐ schemes, rules or methods of playing games.
 - i. ☐ methods for treatment of the human body by surgery or therapy.
 - j. ☐ methods for treatment of the animal body by surgery or therapy.
 - k. ☐ diagnostic methods practised on the human or animal body.
 - l. ☐ mere presentations of information.
 - m. ☐ computer programs for which this International Searching Authority is not equipped to search prior art.

2. ☐ The failure of the following parts of the international application to comply with prescribed requirements prevents a meaningful search from being carried out:

☐ the description
☐ the claims
☐ the drawings

3. ☐ The failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions prevents a meaningful search from being carried out:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

4. Further comments:

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer María Rodríguez Nóvoa
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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 203

The subject-matter claimed in claims 9 to 20 falls under the provisions of Article 17(2)(a)(i) and Rule 39.1(iii) PCT, such subject-matter relating to a method of doing business.

Claims 1 to 8 relate to commonplace technological features for performing the business method of the method claims. Although these claims do not literally belong to the method category, they essentially claim protection for the same commercial effect as the method claims. With reference to the Guidelines, B-VIII, points 1-6, the International Searching Authority considers that searching such commercial features would serve no useful purpose. This applies to the remaining commonplace technological features of these claims as well.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.